(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
31 July 2003 (31.07.2003)

PCT

(10) International Publication Number
WO 2003/061576 A3

(51) International Patent Classification[7]: C07H 19/00, A01N 43/04, A61K 31/70

(21) International Application Number: PCT/US2003/001545

(22) International Filing Date: 17 January 2003 (17.01.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/350,296 17 January 2002 (17.01.2002) US

(71) Applicant *(for all designated States except US)*: **RIB-APHARM INC.** [US/US]; 3300 Hyland Avenue, Costa Mesa, CA 92626 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **AN, Haoyun** [US/US]; 7864 Paseo Tulipero, Carlsbad, CA 92009 (US). **DING, Yili** [CN/US]; 16655 Mt. Michaelis Circle, Fountain Valley, CA 92708 (US). **CHAMAKURA, Varaprasad** [IN/US]; 1300 Adams Avenue, #11G, Costa Mesa, CA 92626 (US). **HONG, Zhi** [US/US]; 79 Timberland, Aliso Viejo, CA 92656 (US).

(74) Agent: **RUTAN & TUCKER, LLP**; P.O. Box 1950, 611 Anton Blvd., Fourteenth Floor, Costa Mesa, CA 92628-1950 (US).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (utility model), DE, DK (utility model), DK, DM, DZ, EC, EE (utility model), EE, ES, FI (utility model), FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK (utility model), SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

(88) Date of publication of the international search report:
1 April 2004

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: DEAZAPURINE NUCLEOSIDE ANALOGS AND THEIR USE AS THERAPEUTIC AGENTS

(57) Abstract: Methods, compositions, and uses for various deazapurine nucleoside libraries and library compounds are provided. Particularly preferred deazapurine nucleosides include 7-deazapurine nucleosides, 7-deaza-8-azapurine nucleosides, toyocamycin nucleoside analogs, 3-deazapurine nucleosides, and 9-deazapurine nucleosides, while preferred uses especially inlcude use of such compounds as pharmacological, and particularly antiviral agents.

WO 2003/061576 A3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US03/01545

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : C07H 19/00; A01N 43/04; A61K, 31/70
US CL : 536/26.1, 26.11, 26.12, 26.13, 27.21, 27.6, 27.62, 28.5; 514/45, 46, 47, 48, 49

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 536/26.1, 26.11, 26.12, 26.13, 27.21, 27.6, 27.62, 28.5; 514/45, 46, 47, 48, 49

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EAST, STN (REGISTRY, CAPLUS, MEDLINE, BIOSIS)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 576 227 A2 (ELI LILLY AND COMPANY) 29 December 1993 (29.12.1993)	1, 16, 21
—		—
Y		2-4, 17-24
X	CUI et al. Effect of Beth-Enantiomeric and Racemic Nucleoside Analogues on	1, 5, 21
—	Mitochondrial Functions in HepG2 Cells. Biochemical Pharmacology. 1996, Vol. 52,	—
Y	No.10, pages 1577-1584, see entire document.	2-4, 6-7, 22-24
X	ILTZSCH et al. Structure-Activity Relationship for the Binding of Nucleoside Ligands	1, 5, 8, 16
—	to Adenosine Kinase From Toxoplasma Gondii. Biochemical Pharmacology. 1995, Vol.	—
Y	49, No. 10, pages 1501-1512, see entire document..	2-4, 6-7, 9-15, 17-24
X	BHATTACHARYA et al. Synthesis and anti-DNA Viral Activities in Vitro of Certain 2,	1, 21
—	4-Disubstituted-7-(2-deoxy-2-fluoro-B-D-arabinofuranosyl)pyrrolo[pyrimidine	—
Y	Nucleosides. Journal of Medicinal Chemistry. 1995, Vol. 38, pages 3957-3966, see entire document..	2-4, 21-24

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"B" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 April 2003 (21.04.2003)	16 OCT 2003
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230	Authorized officer James O. Wilson Telephone No. (703) 308-1235

Form PCT/ISA/210 (second sheet) (July 1998)

PCT/US03/01545

INTERNATIONAL SEARCH REPORT

C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X — Y	KRAWCZYK et al. Synthesis and Antiproliferative and Antiviral Activity of 2'-Deoxy-2-fluoroarabinofuranosyl Analogs of the Nucleoside Antibiotics Toyocamycin and Sangivamycin. Journal of Medicinal Chemistry. 1995, Vol. 38, pp. 4106-4114, see entire document.	1, 5, 21 ——— 2-4, 6-7, 22-24
X — Y	MAYERS, L. et al. Anti-human Immunodeficiency Virus 1 (HIV-1) Activiies of 3-deazaadenosine Analogs: Increased potency against 3'-azido-3-' -deoxythymidine-resistant HIV-1 strains. Proceedings of the National Academy of Science, USA, 1995, Vol. 92, No. 1, pages 215-219, see entire document.	16, 21 ——— 17-24
X — Y	SHORTNACY-FOWLER, T. et al. Synthesis and Biological Activity of 2'-Fluoro-D-arabinofuranosylpyrazolo[3,4-d]pyrimidine Nucleosides. Helvetica Chimica Acta. 1999, Vol. 82, pages 2240-2245, see entire document.	8, 21 ——— 9-11, 22-24
X — Y	DAELEMANS et al. S-Adenosylhomocysteine Hydrolase Inhibitors Interfere With The Replication of Human Immunodeficiency Virus Type 1 Through Inhbition of the LTR Transactivation. Molecular Pharmacology. 1997, Vol. 52, pages 1157-1163, see entire document.	1, 16, 21 ——— 2-4, 17-20, 22-24
Y	WO 01/90121 A2 (NOVIRIO PHARMACEUTICALS LIMITED et al.) 29 November 2001 (29.11.2001).	1-24
Y	WO 01/92282 A2 (NOVIRIO PHARMACEUTICALS LIMITED) 06 December 2001 (06.12.2001).	1-24
X, P	WO 02/057425 A2 (MERCK & CO., INC.) 25 July 2002 (25.07.2002).	1-24
X, P	WO 02/32920 A2 (PHARMASSET LIMITED) 25 April 2002 (25.04.2002).	1-24
Y, P	WO 02/18404 A2 (F. HOFFMANN-LA ROCHE AG) 07 March 2002 (07.03.2002).	1-24